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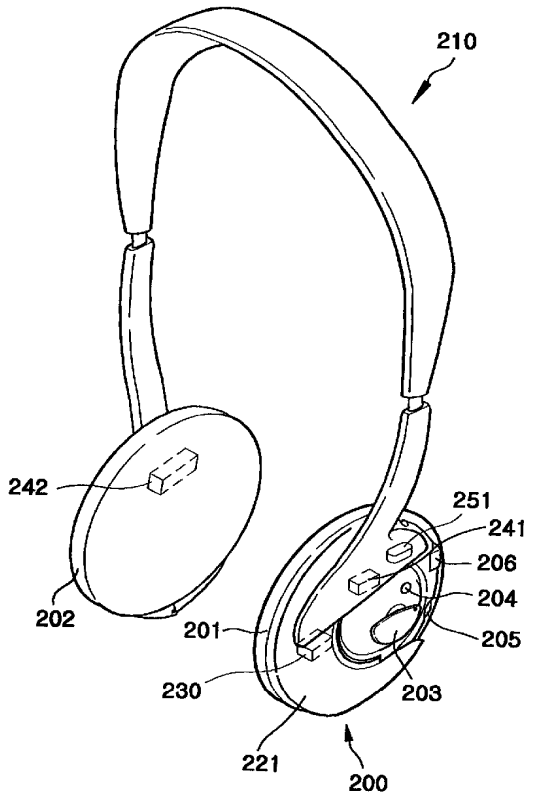
(54) Title: WIRELESS HEADSET SYSTEM USING INFRARED TRANSMITTER AND WIRELESS HEADPHONE



(57) Abstract: A wireless headset system using a wireless headphone and an infrared transmitter. The wireless headphone according to the present invention comprises first and second light receiving units installed at desired positions of earpieces and including a plurality of light receiving elements covering different directions, each of the first and second light receiving units receiving signals radiated from an infrared transmitter with certain information, a circuit for receiving the signals from each of the first and second light receiving units and demodulating the received signals first and second audio output units for receiving the demodulated signals from the circuit, converting the demodulated signals into sound signals and outputting the sound signals, and a rechargeable battery installed in one of the earpieces, the rechargeable battery supplying power to the first and second light receiving units, the circuit, and the first and second audio output units.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Wireless headset system using infrared transmitter and wireless headphone

Technical Field

The present invention relates to a transceiver for transmitting and receiving a radio signal, and more particularly to a wireless headset system using an infrared transmitter and a wireless headphone which is capable of receiving a voice signal using infrared.

Background Art

Generally, it is possible to transmit and receive sound within a short distance using wired and wireless communication technologies. The wireless communication technology performs a communication with no wired cable, resulting in no inconvenience due to the wired cable. This wireless communication technology is widely used because the users can receive and listen to a sound signal while moving, owing to its large communicating radius.

This conventional wireless communication technology employs a signal transfer device which can transmit and receive a sound signal using an ultrashort wave. The usage of the ultrashort wave causes an electronic circuit to be large, so that it is difficult to minimize the size of the electronic circuit. Further, the wireless communication technology is disadvantageous due to interference among

signals in that high noise may be caused, and higher capacity of a battery installed in the device is needed because of an increase in power consumption of an amplifier transmitting signals. For this reason, the lifetime of the battery is short and it is difficult to minimize the size of the device.

Disclosure of the Invention

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a wireless headset system using a wireless headphone and infrared transmitter, which is capable of minimizing noise and power consumption and transmitting and receiving sound signals from an audio device using infrared.

It is another object of the present invention to provide a wireless headset system using a wireless headphone and infrared transmitter, which can continuously receive and output sound signals radiated from the infrared transmitter regardless of the movement of its user.

It is yet another object of the present invention to provide a wireless headset system using a wireless headphone and infrared transmitter, which can prevent noise from occurring by muting output signals even though there is an obstruction between the wireless headphone and the infrared transmitter, or even though the wireless headphone 200 is outside its receiving range.

In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of a wireless headphone comprising first and second light receiving units installed at desired positions of earpieces and including a plurality of light receiving elements covering different directions, each of the first and second light receiving units receiving signals radiated from an infrared transmitter with certain information; a circuit for receiving the signals from each of the first and second light receiving units and demodulating the received signals; first and second audio output units for receiving the demodulated signals from the circuit, converting the demodulated signals into sound signals and outputting the sound signals; and a rechargeable battery installed in one of the earpieces, the rechargeable battery supplying power to the first and second light receiving units, the circuit, and the first and second audio output units.

With this construction, the wireless headphone according to the present invention can safely receive the output signals radiated from the infrared transmitter regardless of movement of the user, thereby allowing the user to comfortably listen to music, etc. in its receiving range with no discontinuousness.

Preferably, the wireless headphone may further comprise a charge indicator for indicating a charging state of the rechargeable battery.

With the charge indicator, the wireless headphone

according to the present invention can indicator a charge state of the battery, thereby allowing the user to easily recognize the charge state of the wireless headphone

In accordance with another aspect of the present invention, there is provided a wireless headset system comprising an infrared transmitter; and a wireless headphone; the infrared transmitter including a first circuit for receiving audio signals form an audio device, amplifying the received audio signals and frequency-modulating the amplified audio signals, a transmission unit for receiving the modulated audio signals, modulating the received audio signals to infrared signals and radiating the infrared signals to the wireless headphone within a certain distance using at least one light emitting element, a charger for charging a rechargeable battery installed in the infrared transmitter receiving the infrared signals, and a power supply for providing a power voltage to the first circuit and the transmission unit, the wireless headphone including first and second light receiving units including a plurality of light receiving elements covering different directions, each of the first and second light receiving units receiving signals radiated from an infrared transmitter with certain information, a circuit for receiving the signals from each of the first and second light receiving units and demodulating the received signals, first and second audio output units for receiving the demodulated signals from the circuit, converting the demodulated signals into sound signals and output the sound

signals, and the rechargeable battery installed in one of the earpieces, the rechargeable battery supplying power to the first and second light receiving units, the circuit, and the first and second audio output units.

The wireless headset system according to the present invention can minimize the size of the transmitter due to the usage of infrared instead of an electromagnetic wave, and provide sound of high quality without interference due to directivity of the infrared.

Preferably, the infrared transmitter may further include a microphone for converting voice signals entered from a user into electric signals to provide the converted electric signals to the audio device; a second circuit for receiving the converted electric signals from the microphone, amplifying the electric signals to output the amplified electric signals to the audio device; and a second connection jack for bypassing the amplified electric signals from the second circuit to the audio device.

With this construction, the wireless headset system according to the present invention allows a user to easily communicate with another through the microphone provided to the infrared transmitter if the user uses an Internet phone.

Preferably, the infrared transmitter may further include a fixing part provided to fix the infrared transmitter to a support member, and wherein the fixing part enables the infrared transmitter to be turned to the right and left, upwardly and downwardly.

The infrared transmitter according to the present

invention can be fixed to the support member such as a desk, monitor of a computer, running machine or the like using the fixing part. It is possible to control the angle and direction of the infrared transmitter such that it is directed toward the user.

Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1a is a perspective view of an infrared transmitter according to the present invention;

Fig. 1b is a bottom view of the infrared transmitter according to the present invention;

Fig. 2 is a block diagram schematically showing the construction of a first circuit in the infrared transmitter of Fig. 1a;

Fig. 3 is a block diagram schematically showing the construction of a second circuit in the infrared transmitter of Fig. 1a;

Fig. 4 is a perspective view of a wireless headphone according to the present invention;

Fig. 5 is a view showing light receiving ranges of light receiving elements in Fig. 4;

Fig. 6 is a block diagram schematically showing the construction of a circuit in Fig. 4; and

Fig. 7 is a view illustrating an example of using a wireless headset system according to the present invention.

Best Mode for Carrying Out the Invention

Figs. 1a and 1b respectively show perspective and bottom views of an infrared transmitter of a wireless headset system according to a preferred embodiment of the present invention. As shown in Fig. 1a, the infrared transmitter 100 comprises a case 101, first circuit 120, transmission unit 110 and charger 150 according to the embodiment of the present invention. The infrared transmitter 100 may further comprise a microphone 130, second circuit 140 and fixing part 160 according to another embodiment of the present invention. Although not shown in this drawing, the infrared transmitter 100 further comprises a power supply.

The first circuit 120 functions to receive audio signals containing voice information from an audio device (not shown), amplify the input audio signals, frequency-modulate the amplified audio signals and output the modulated audio signals to the transmission unit 110. The first circuit 120 is installed in the case 101. As shown in Fig. 1b, the first circuit 120 is electrically connected to the audio device through a first connection jack 171. The first circuit 120 is provided with the audio signals from the audio device under the condition that the first connection jack 171 is connected to the audio device. The audio device may be a personal computer, television, CD player or the like.

The transmission unit 110 functions to receive the frequency-modulated audio signals from the first circuit 120, modulate the frequency-modulated audio signals of R and L channels to generate infrared signals and radiate the generated infrared voice signal to a receiver within a given distance, that is, a wireless headphone. It is desired that the transmission unit 110 includes at least one light-emitting element which is an infrared transducer, and that a number of light-emitting elements are preferably arranged in series in such a way that the infrared signals are effectively transmitted. Further, it is desired that the light-emitting elements of the transmission unit 110 are installed at the rear of the case 101 as shown in Fig. 1a because of directivity of the infrared signals outputted through the transmission unit 110 according to another embodiment of the present invention.

The charger 150 is provided in the infrared transmitter 100 to charge a rechargeable battery 251 (shown in Fig. 4) installed in the wireless headphone receiving the infrared signals. The power supply (not shown) connected to the outside functions to provide a supply voltage to the first circuit 120 and transmission unit 110.

The infrared transmitter 100 further comprises the microphone 130, the second circuit 140 and a second connection jack 172 according to another embodiment of the present invention. The microphone 130 functions to receive voice signals from a user and convert the voice signals into electric signals such that the converted voice signal is

applied to the audio device. It is preferred that the microphone 130 is installed at the rear of the case 101, as shown in Fig. 1a. The second circuit 140 is installed inside the case 101. The second circuit 140 functions to amplify the signals inputted from the microphone 130 and apply the amplified signals to the audio device while being connected to the audio device through the second connection jack 172 shown in Fig 1b.

Although the transmission unit 110 and microphone 130 are installed at the rear of the case 101 according to the preferred embodiment of the present invention, those skilled in the art will appreciate that the transmission unit 110 and microphone 130 are not limited to such a position and that they can be installed at various positions and in various forms according to characteristics of the infrared transmitter.

The infrared transmitter 100 further comprises the fixing part 160 according to another embodiment of the present invention. The infrared transmitter 100 can be fixed to a support member such as a desk, monitor of a computer, running machine or the like using the fixing part 160. The fixing part 160 enables the infrared transmitter 100 to be turned to the right and left, upwardly and downwardly. Therefore, the user can freely use the infrared transmitter while running on the running machine, watching the television, listening to music using the computer or the like. Further, the user can easily adjust angle and direction of the infrared transmitter 100 fixed to the support member such that the infrared

transmitter 100 is directed toward him/her.

The infrared transmitter 100 further comprises in its back the first connection jack 171, a CD power supply terminal 174, charge terminal 175 and a transmitter driving switch 173 according to another embodiment of the present invention. The first connection jack 171 is adapted to transfer the voice signals from the audio device to the first circuit 120. The DC power supply terminal 174 is adapted to be provided with a DC supply voltage through an adaptor which converts an external power voltage such as a commercial AC voltage (of 110V or 220V) into the DC supply voltage in order to drive the infrared transmitter 100. The charge terminal 175 is adapted to provide a voltage provided from the charger 150 to the rechargeable battery installed in the wireless headphone. Further, the infrared transmitter 100 comprises the second connection jack 172 through which the user's voice is transferred from the microphone 130 installed at the rear of the infrared transmitter 100 to the audio device.

Fig. 2 is a block diagram schematically showing the construction of the first circuit 120 in Fig. 1a. As shown in this drawing, the first circuit 120 includes an input unit 121, amplifier 122, automatic gain controller 123, stereophonic sound processor 124, pre-amplifier 125 and voltage controlled oscillator 126.

The input unit 121 receives the audio signals of the R and L channels provided through the first connection jack 171 and outputs the received audio signals to the amplifier

122 to amplify the audio signals of the R and L channels. Then, the amplifier 122 amplifies the audio signals from the input unit 121 and outputs the amplified audio signals to the automatic gain controller 123.

The automatic gain controller 123 functions to adaptively control a gain according to the levels of the audio signals inputted from the input unit 121. Namely, the automatic gain controller 123 controls the input signals in such a way that an output characteristic amplitude of each of the audio signals amplified by the amplifier 122 can be constantly maintained to such an extent that the output characteristic amplitude is within a characteristic range of the automatic gain controller 123 regardless of the variation of the levels of the input audio signals. The automatic gain controller 123 controls the gain to output the audio signals whose levels are constant to a certain extent, so that the audio signals have amplitudes appropriate to an modulation of the voltage controlled oscillator 126 which is the next modulator.

The stereophonic sound processor 124 imparts a stereo surround effect to the audio signals inputted in stereo. The pre-amplifier 125 amplifies the low level audio signals from the stereophonic sound processor 124 and then outputs the amplified audio signals to the voltage controlled oscillator 126.

The voltage controlled oscillator 126 changes the voltage levels of the audio signals from the pre-amplifier 125 to oscillate at different constant frequencies. That is,

the voltage controlled oscillator 126, which is a frequency modulator, modulates the audio signals of the R and L channels at different frequencies, for example, 2.8 MHz (for the R channel signals) and 2.3MHz (for the L channel signals) such that a stereo transmission is supported.

The audio signals inputted to the first circuit 120 through the first connection jack are modulated at different frequencies according to the R and L channels, and then outputted. The outputted audio signals of the R and L channels are infrared-modulated, respectively, then mixed with each other, and radiated through the light-emitting element.

The final amplified signals which are mixed, for example, by wired-Oring, drive a plurality of LEDs (for example, three LEDs) connected to each other in series. Therefore, signals radiated from each of the LEDs include the signals of the R and L channels separated according to their frequencies.

Fig. 3 is a block diagram schematically showing the construction of a second circuit 140 in the infrared transmitter of Fig. 1. As shown in this drawing, the second circuit 140 includes an amplifier 141 and output unit 142.

The amplifier 141 amplifies the voice signals inputted from the microphone 130 and outputs the amplified voice signals to the output unit 142. The output unit 142 receives the voice signals amplified by the amplifier 141, changes the voltage levels of the amplified voice signals to desired voltage levels such that the audio device 300 can receive

the voice signals, and then outputs the resulting audio signals to the device 300.

Fig. 4 shows the wireless headphone 200 according to a preferred embodiment of the present invention. As shown in this drawing, the wireless headphone 200 comprises a pair of earpieces 201 and 202, a driving switch 203, charge terminal 206, the rechargeable battery 251 and a headband 210. The driving switch 203 is installed on a side surface of the earpiece 201 to operate the wireless headphone 200. The charge terminal 206 is installed on a side surface of the earpieces 201 to bypass a supply voltage from the infrared transmitter 100 to the rechargeable battery 251. The earpieces 201 and 202 are physically connected to each other through the headband 210, through which at least one electric wire passes. The electric wire is provided to connect a second light receiving unit 222 and a second audio output unit 242 to a circuit 230. It should be noted that the headphone according to the present invention is not limited to top-head type. The headphone may have a back-head type or a type where the earpieces 201 and 202 are connected to each other through a wire instead of the headband 210.

As shown in Fig. 4, the wireless headphone 200 according to the present invention further comprises a first light receiving unit 221, the second light receiving unit 222, the circuit 230, a first audio output unit 241, the second audio output unit 242 and the rechargeable battery 251. The first and second light receiving units 221 and 222 function to receive signals from the infrared transmitter 100. The

circuit 230 functions to demodulate the received signals. The first and second audio output units 241 and 242 function to output the demodulated signals. According to another embodiment of the present invention, the wireless headphone 200 may further comprise a charge indicator 204 for indicating a charging state thereof and a volume adjustment unit 205 for adjusting an output sound volume.

The first and second light receiving units 221 and 222 are installed at desired positions of the earpieces 201 and 202, respectively, and input signals which are radiated from the infrared transmitter 100 and contain certain information. Each of the first and second light receiving units 221 and 222 has light receiving elements on the surface of the corresponding earpiece. It is preferred that the light receiving elements on the surface of each of the earpieces are arranged in such a way as to cover different directions in order to effectively receive infrared signals from the infrared transmitter 100. The light receiving elements 223, 224 and 225 of each of the first and second light receiving units 221 and 222 are electrically connected in parallel to each other as shown in Fig. 6. Electrical signals outputted from the light receiving elements 223, 224 and 225 are added because each of the light receiving elements connected in parallel to each other receives and processes the infrared signals which are mixed with each other with separation of basic frequency band and have different frequencies respectively.

The light receiving elements 223, 224 and 225 are

installed on the surface of each of the earpieces. Preferably, the light receiving elements 223, 224 and 225 are respectively installed adjacent to left and right ends and a lower end of each of the earpieces such that each of the light receiving elements safely receives the infrared signals transmitted from the infrared transmitter 100 and converts the received infrared signals into electrical signals. While the user uses the computer, the wireless headphone 200 can receive the infrared signals through the light receiving elements installed adjacent to the left and right ends. While the user runs on the running machine, the wireless headphone 200 can receive the infrared signals through the light receiving element installed adjacent to the lower end because the wireless headphone 200 is generally positioned higher than the infrared transmitter 100.

Therefore, the wireless headphone 200 according to the present invention has an advantage in that it can continuously receive the infrared signals from the infrared transmitter 100 regardless of movement of the user.

The circuit 230 is installed in any one of the earpieces 201 and 202. The circuit 230 demodulates the infrared signals inputted through the first light receiving unit 221 or the second light receiving unit 222. Fig. 6 is a block diagram schematically showing the construction of the circuit 230. As shown in this drawing, the circuit 230 includes an input unit 231, amplifier 232, demodulator 233 and output unit 235. Preferably, the circuit 230 may further

include a mute unit 234, according to another embodiment of the present invention.

The input unit 231 receives the signals of the R and L channels, which signals are mixed with each other with the separation of the basic frequency band and inputted thereto from the infrared transmitter 100 through the first and second light receiving units 221 and 222. The amplifier 232 amplifies the mixed signals inputted from the input unit 231 to desired levels and filters frequencies of a band corresponding to the R and L channels from the amplified signals to separate the frequencies. The amplifier 232 output the separated frequencies to the demodulator 233 to demodulate them. The demodulator 233 demodulates the frequency-modulated output signals, which are divided into the R and L channels by the amplifier, to their original state. The output unit 235 amplifies the signals demodulated by the demodulator 233 and transfers the resulting signals to the first and second audio output units 241 and 242.

The mute unit 234 mutes the output signals from the demodulator 233, while the wireless headphone 200 is outside its receiving range. Because of this mute function of the mute unit 234, it is possible to prevent the output unit 235 from outputting noise even though there is an obstruction between the wireless headphone 200 and the infrared transmitter 100, or even though the wireless headphone 200 is outside the receiving range.

Referring again to Fig. 4, the first and second audio output units 241 and 242 convert the signals, which are

respectively demodulated according to the R and L channels, into sound signals that the user can listen to, and outputs the sound signals. The rechargeable battery 251 is installed at a desired position inside the earpiece 201. The rechargeable battery 251 supplies the first and second light receiving units 221 and 222, the circuit 230 and the first and second audio output units 241 and 242 with power needed to drive each of them.

The charge indicator 204 indicates the charging state of the rechargeable battery 251. The user can easily recognize the charging state of the wireless headphone 200 through the charge indicator 204 while using the wireless headphone 200. The volume adjustment unit 205 adjusts volume of the sound signals from the first and second audio output units 241 and 242. The user can easily freely adjust the volume of the output sound.

Fig. 7 is a view illustrating an example of using a wireless headset system according to a preferred embodiment of the present invention. This drawing shows a situation where the user listens to music at his/her desk while doing work. The infrared transmitter 100 is provided with the sound signals from a personal computer 300 and transmits the sound signals to the wireless headphone 200. The user can listen to the sound signals from the infrared transmitter 100 using the wireless headphone 200. The wireless headphone 200 and infrared transmitter 100 enable the user to listen to music or to use an Internet phone with the microphone 130 installed in the infrared transmitter 100 while he/she does

work.

Industrial Applicability

As apparent from the above description, the present invention provides a wireless headset system using an infrared transmitter and a wireless headphone, wherein the wireless headphone can receive sound signals radiated from the infrared transmitter through light receiving elements which are arranged in such a way as to cover different directions, thereby being capable of safely receiving and outputting the sound signals regardless of movement of the user wearing the headphone.

In the present invention, the usage of infrared allows a battery to have a long lifetime due to low power consumption compared to the usage of a high frequency, thereby allowing the size of the transmitter to be minimized. Further, there is a low signal cross talk and no trouble due to light interference, resulting in an increase in signal to noise (S/N) ratio and in an improvement in the quality of sound.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims:

1. A wireless headphone comprising:

first and second light receiving units installed at desired positions of earpieces and including a plurality of light receiving elements covering different directions, each of the first and second light receiving units receiving signals radiated from an infrared transmitter with certain information;

a circuit for receiving the signals from each of the first and second light receiving units and demodulating the received signals;

first and second audio output units for receiving the demodulated signals from the circuit, converting the demodulated signals into sound signals and outputting the sound signals; and

a rechargeable battery installed in one of the earpieces, the rechargeable battery supplying power to the first and second light receiving units, the circuit, and the first and second audio output units.

2. The wireless headphone as set forth in claim 1, wherein each of the first and second light receiving units has the light receiving elements connected in parallel to each other, and wherein each of the light receiving units adds electric signals outputted from the light receiving elements.

3. The wireless headphone as set forth in claim 2, wherein the circuit includes:

an input unit for receiving the signals from each of the first and second light receiving units;

an amplifier for receiving the signals from the input unit and amplifying the received signal;

a demodulator for receiving the signals from the amplifier and demodulating the received signals; and

an output unit for receiving the signals from the demodulator, amplifying the received signals and outputting the amplified signals to each of the first and second audio output units.

4. The wireless headphone as set forth in claim 3, wherein the circuit further includes a mute unit for muting the output signal from the demodulator while the wireless headphone is outside its receiving range.

5. The wireless headphone as set forth in claim 1 or claim 4, further comprising a charge indicator for indicating a charging state of the rechargeable battery.

6. The wireless headphone as set forth in claim 5, further comprising a volume adjustment unit for controlling volume of the output signals from the first and second audio output units.

7. The wireless headphone as set forth in claim 1,

further comprising:

a driving switch provided to a side surface of one of the earpieces, for driving the wireless headphone; and

a charge terminal for bypassing a power voltage supplied from the infrared transmitter to the rechargeable battery.

8. A wireless headset system comprising:

an infrared transmitter ; and

a wireless headphone;

the infrared transmitter including

a first circuit for receiving audio signals form an audio device, amplifying the received audio signals and frequency-modulating the amplified audio signals,

a transmission unit for receiving the modulated audio signals, modulating the received audio signals to infrared signals and radiating the infrared signals to the wireless headphone within a certain distance using at least one light emitting element,

a charger for charging a rechargeable battery installed in the infrared transmitter receiving the infrared signals, and

a power supply for providing a power voltage to the first circuit and the transmission unit,

the wireless headphone including

first and second light receiving units including a plurality of light receiving elements covering different

directions, each of the first and second light receiving units receiving signals radiated from an infrared transmitter with certain information,

a circuit for receiving the signals from each of the first and second light receiving units and demodulating the received signals,

first and second audio output units for receiving the demodulated signals from the circuit, converting the demodulated signals into sound signals and output the sound signals, and

the rechargeable battery installed in one of the earpieces, the rechargeable battery supplying power to the first and second light receiving units, the circuit, and the first and second audio output units.

9. The wireless headset system as set forth in claim 8, wherein the first circuit has:

an input unit for receiving the audio signals from the audio device;

an amplifier for receiving the audio signals from the input unit and amplifying the received audio signals;

an automatic gain controller for controlling the amplified audio signals in such a way that an output characteristic amplitude of each of the audio signals constantly maintained so that the output characteristic amplitude is within a characteristic range of the automatic gain controller regardless of a variation of the levels of the input audio signals;

a stereophonic sound processor for receiving the audio signals outputted from the automatic gain controller and imparting a stereo surround effect to the audio signals received in stereo from the automatic gain controller;

a pre-amplifier for receiving the audio signals from the stereophonic sound processor and amplifying the received audio signals; and

a voltage controlled oscillator for receiving the amplified audio signals from the pre-amplifier and oscillating at different constant frequencies by changing the voltage levels of the audio signals.

10. The wireless headset system as set forth in claim 8, wherein the infrared transmitter further includes:

a first connection jack for bypassing the audio signals from the audio device to the first circuit;

a charge terminal for bypassing a voltage from the charger to the rechargeable battery installed in the infrared transmitter;

a power supply terminal provided with an external power voltage for driving the infrared transmitter.

11. The wireless headset system as set forth in claim 8 or claim 10, wherein the infrared transmitter further includes:

a microphone for converting voice signals entered from a user into electric signals to provide the converted electric signals to the audio device;

a second circuit for receiving the converted electric signals from the microphone, amplifying the electric signals to output the amplified electric signals to the audio device; and

a second connection jack for bypassing the amplified electric signals from the second circuit to the audio device.

12. The wireless headset system as set forth in claim 11, wherein the second circuit has:

an amplifier for receiving the voice signals from the microphone and amplifying the received voice signals; and

an output unit for receiving the voice signals from the amplifier, changing a voltage level of the voice signals to a voltage level acceptable to the audio device.

13. The wireless headset system as set forth in claim 8, wherein the first circuit and the charger are installed in the infrared transmitter, and wherein the light emitting element is arranged at the rear of the.

14. The wireless headset system as set forth in claim 8, wherein the infrared transmitter further includes a fixing part provided to fix the infrared transmitter to a support member, and wherein the fixing part enables the infrared transmitter to be turned to the right and left, upwardly and downwardly.

15. The wireless headset system as set forth in claim 11, wherein the infrared transmitter further includes a fixing part provided to fix the infrared transmitter to a support member, and wherein the fixing part enables the infrared transmitter to be turned to the right and left, upwardly and downwardly.

Fig.1a

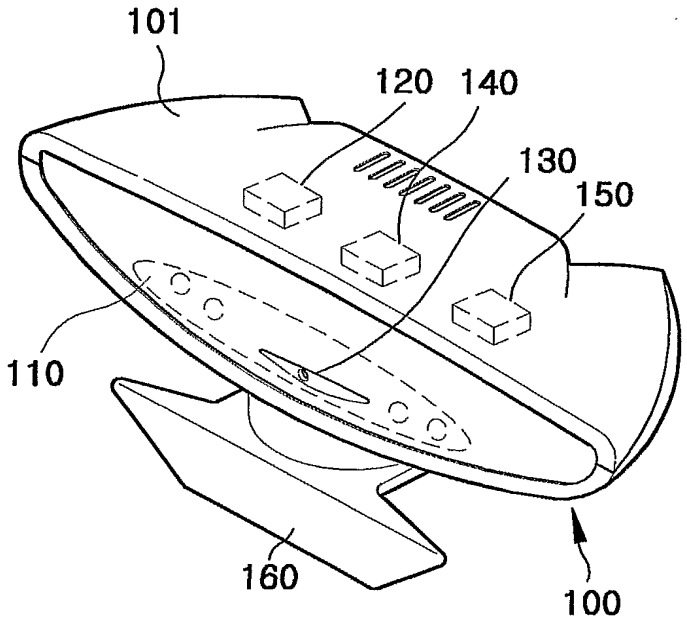
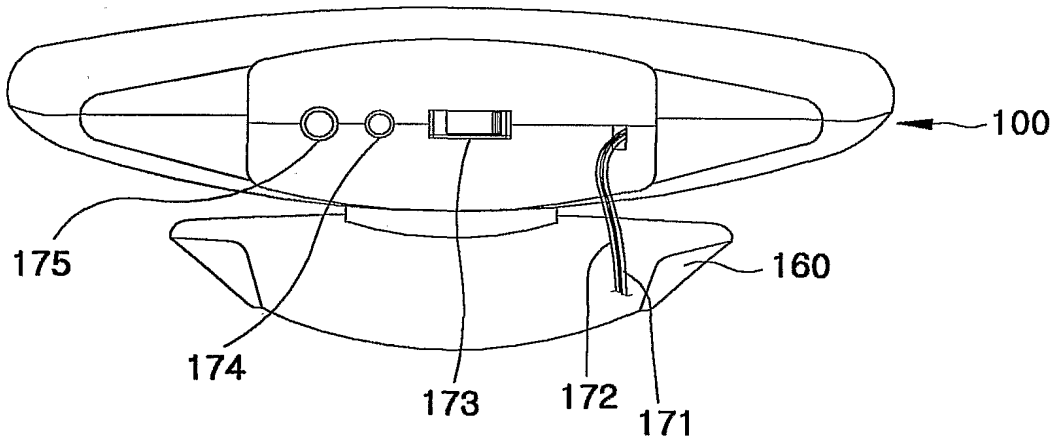


Fig.1b



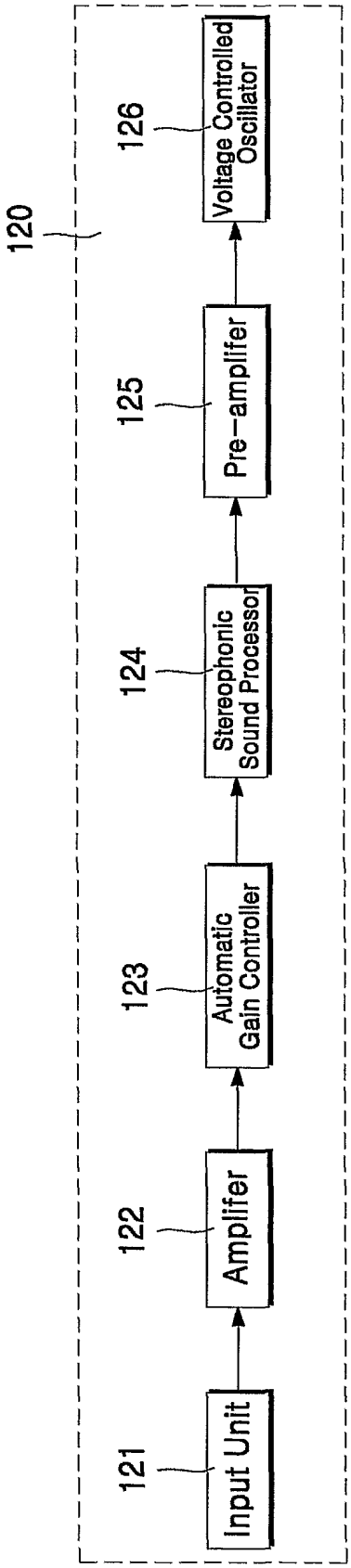

120
121
Input Unit
122
Amplifer
123
Automatic Gain Controller
124
Stereophonic Sound Processor
125
Pre-amplifer
126
Voltage Controlled Oscillator

Fig.2

Fig.3

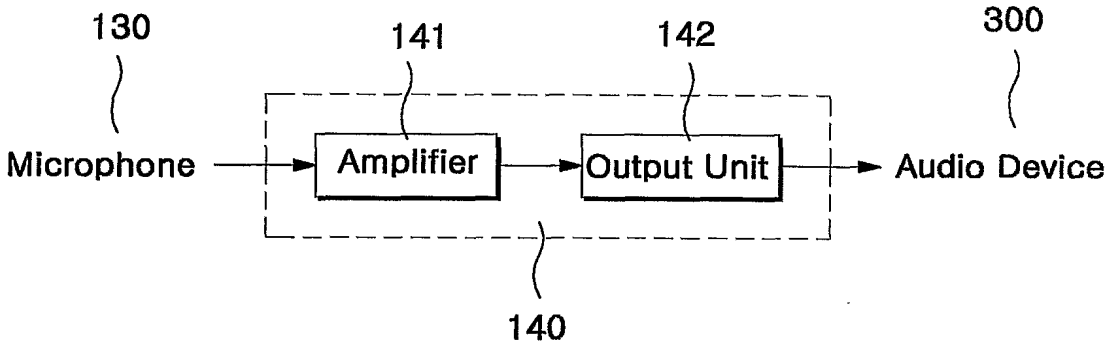

130
141
142
300
Microphone
Amplifier
Output Unit
Audio Device
140

Fig.4

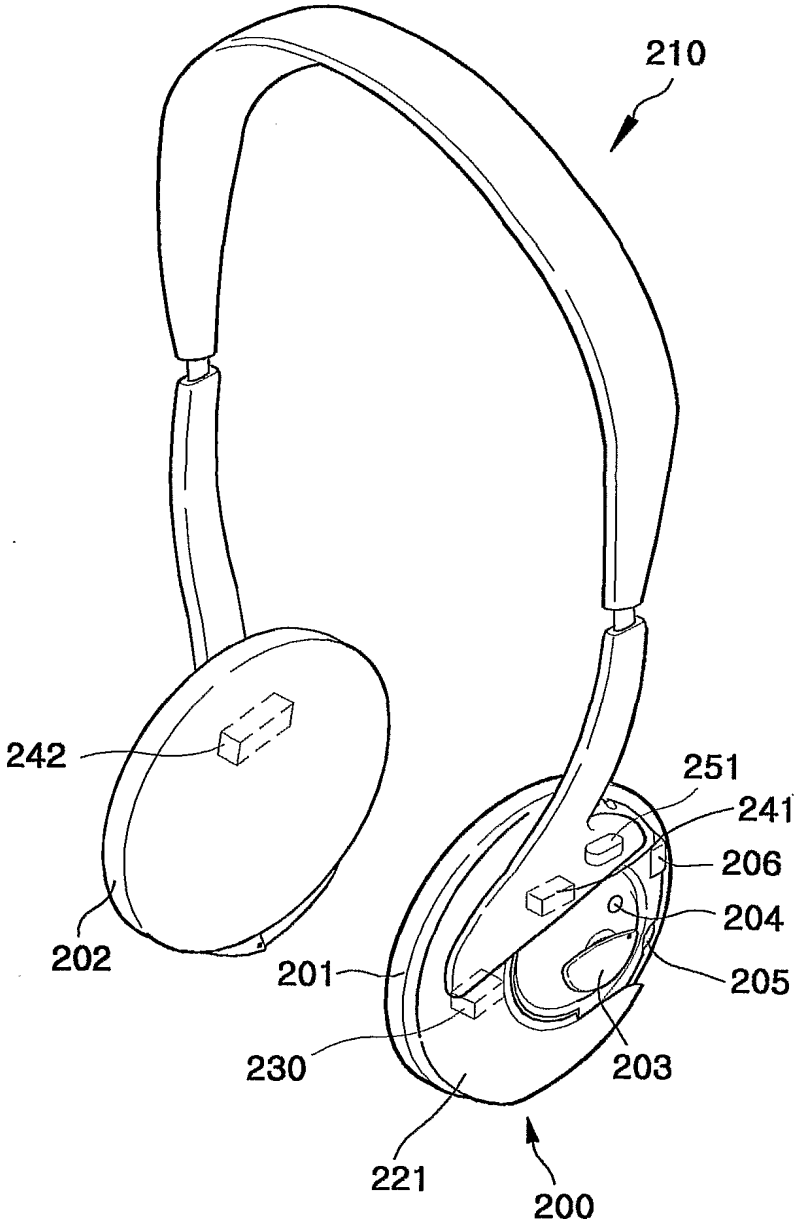


Fig.5

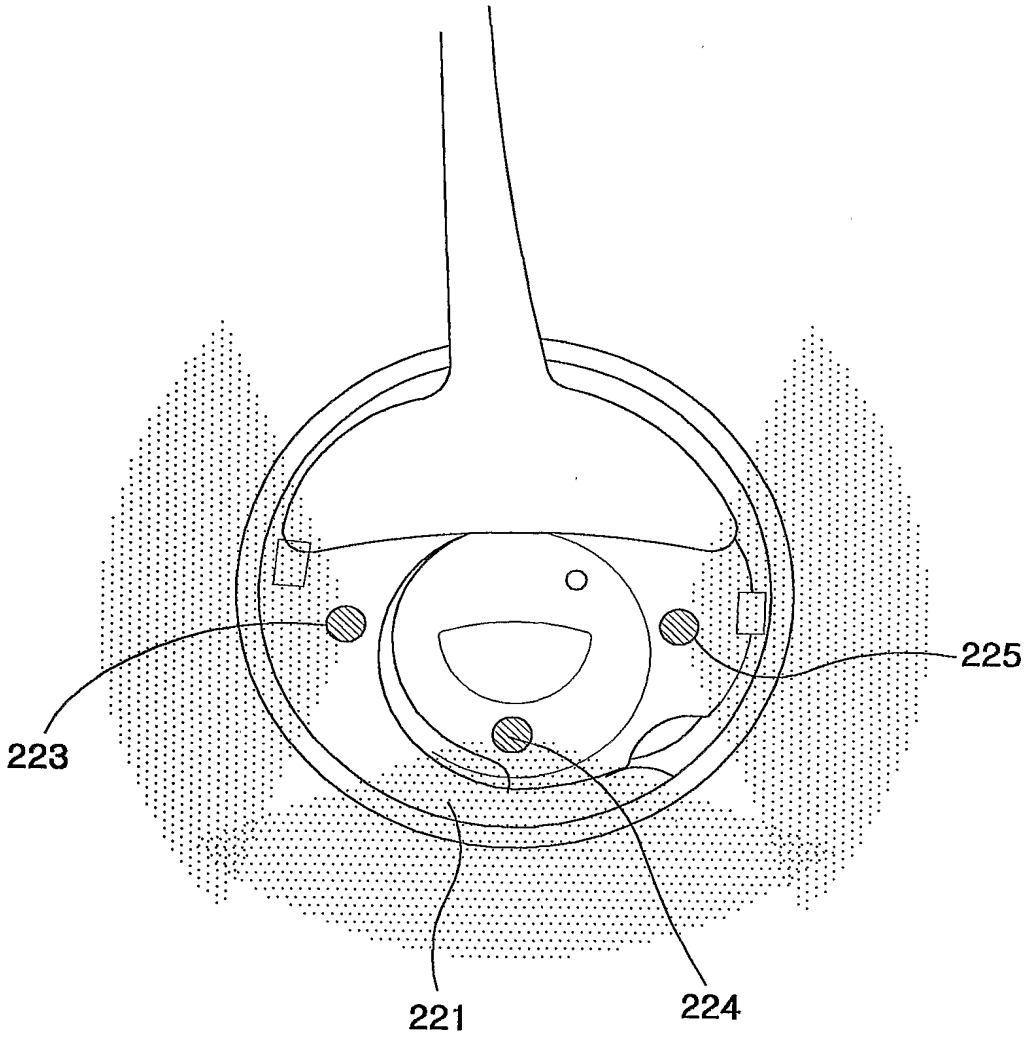


Fig.6

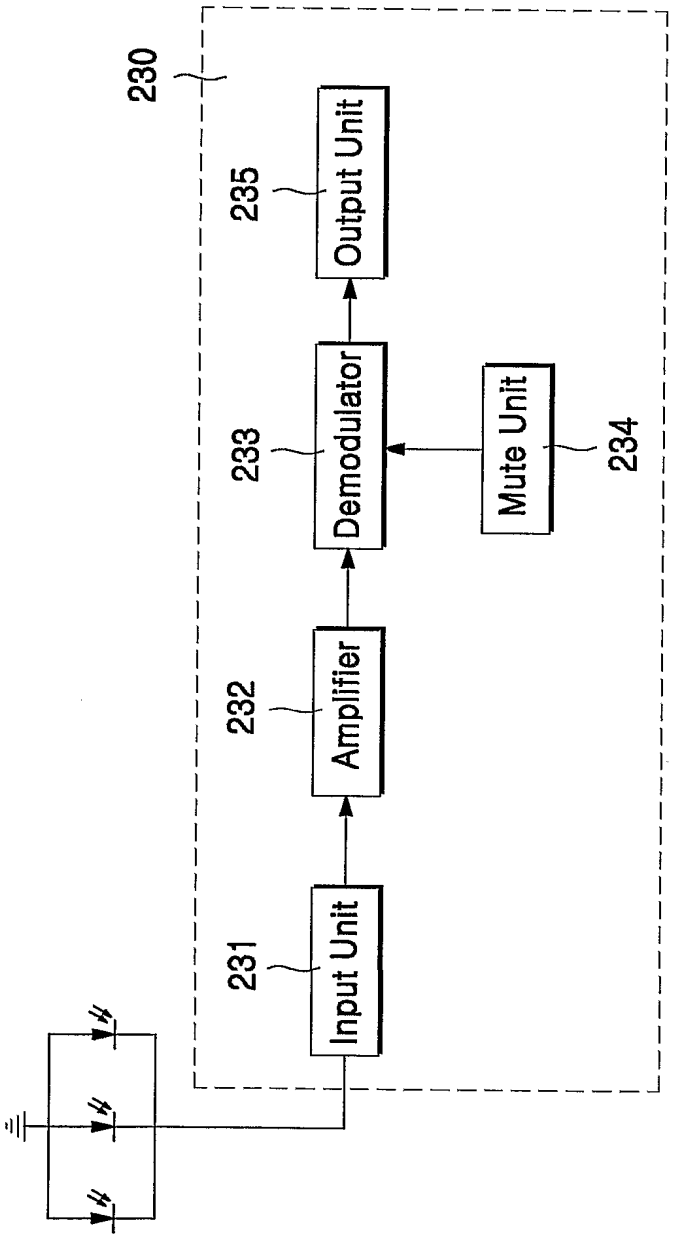
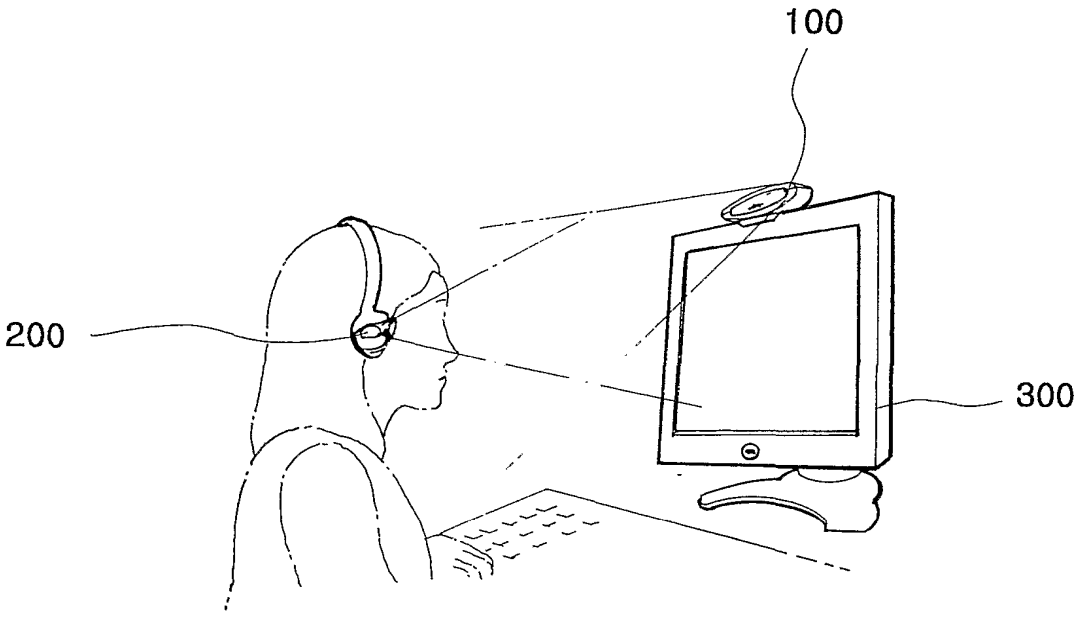

230
231
Input Unit
232
Amplifier
233
Demodulator
234
Mute Unit
235
Output Unit

Fig.7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/00510

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04M 1/737

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC7 H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KR; IPC as above

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 02-246598 A (SONY Co.) 02 October 1990 See the whole document	1-15
Y	KR 2000-196444 Y1 (Narunet Co.) 15 September 2000 See the whole document	1-15
A	JP 03-214883 A (SONY Co.) 20 September 1991 See the whole document	1-15
A	US 5.596,603 A (Sennheiser electronic KG) 21 January 1997 See the whole document	1-15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
05 JULY 2002 (05.07.2002)	06 JULY 2002 (06.07.2002)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR02/00510

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